Section 4-1: Experiments and Probabilities

By the end of this lesson, you should be able to answer:

- How do you collect data with experiments?
- How do you use data to find experimental probabilities?

Where you might see this in the real world:

- Music, market research, games, statistics, probability

Define the following terms:

1. Experiment

2. Relative frequency

3. Experimental probability

Obtain a coin and flip it 30 times. Keep track of your results in the table below.

Event	Tally	Results
Heads Up		
Tails Up		

What is the ratio of heads up to the total number of tosses?

The experiment you just conducted was an experiment on probability. From the coin you used, you have found a probability of having a coin land heads up. Your outcome should be close to a 50% probability, since the coin is "fair," meaning there is an equal chance for each outcome. Then again, in the real world, things don't always turn out as we may have expected as we're not always sure of what the outcome will be. Thus, we conduct an experiment to find out how many times the outcome we want occurs during all of our observations.

To figure this out, we use the formula for experimental probability, which tells us how likely an event will be according to our experiment.

$P(E) =$

Example 1: Maggie Brann gave samples of a new lipstick and asked the women who received the samples to rate the lipstick according to certain standards of appeal. The results of the survey are at the left.

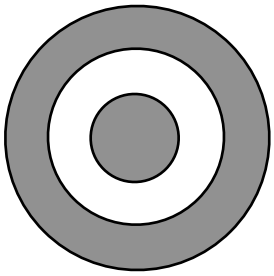
Scores	Frequency
50-59	1
60-69	4
70-79	2
80-89	6
90-99	2

What is the experimental probability that a woman who received a lipstick sample gave it a rating of at least 80?

In this case, we looked at the probability of a score of at least 80. This means there were many different possible outcomes we were looking at. In the case of our opening activity, we wanted to know the probability of a "heads," so there was only one possible outcome we wanted.

Sometimes we will be looking at the probability using an **area model**. For this, we will still use the same idea as experimental probability, but instead of using our outcomes, we will use areas.

Example 2: What is the probability that a dart thrown at this dartboard will land in the bull's-eye? The radius of the smallest circle is 2 cm. The width of each band is also 2 cm.



All we did here was take the area of the smallest circle and divide it by the area of the largest circle. This will work for any area probability problem.

$P(\text{Area}) =$

Problem Set:

"Liberty means responsibility. That is why most men dread it." – George Bernard Shaw